**Sandra Marcela Loría-Salazar**

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**Research interests:**

* Satellite remote sensing
* Interdisciplinary research to investigate atmospheric aerosol physics
* Boundary layer meteorology
* Data assimilation using numerical weather prediction models and satellite retrievals
* Numerical simulations
* Field experiments
* Aerosol transport and relationships with atmospheric physical phenomena
* Big data

**Education:**

* **Doctor of Philosophy, Atmospheric Sciences**  2013-2018

University of Nevada, Reno, Nevada

*Area of study:* Model aerosol pollution using satellite retrievals and data assimilation

*Dissertation title:* Determining the effectiveness of satellite remote sensing products to quantify aerosol pollution in the semi-arid western U.S.

* **Master of Science, Atmospheric Sciences**  2011-2013

University of Nevada, Reno, Nevada

*Area of study:* Aerosol physics and aerosol satellite retrievals

*Thesis title:* Comparison of remotely sensed aerosol column optical depth with in-situ measurements and evaluation of aerosol pollution determination from MODIS retrievals for semi-arid Reno, NV, USA

* **Bachelor of Science, Meteorology** 2004-2009

University of Costa Rica, San José, Costa Rica

*Area of study:* Tropical synoptic meteorology

*Senior thesis title:* Dynamics of Hurricane Cesar, the impact on the country and other important hurricanes for Costa Rica.

**Research Experience:**

* School of Meteorology 2020 – 2022

Research Scientist

Jens Redemann, PhD, CLoud-CLimatE-Aerosol-Radiation (CL)2EAR  Research Group

* Supervising graduate students
* Use of satellite retrievals and data assimilation techniques to estimate of surface PM2.5 concentrations Arequipa, Perú.
* Satellite retrievals of wildfires events in the U.S.
* CLoud-CLimatE-Aerosol-Radiation (CL)2EAR  Research Group 2019 – 2020

School of Meteorology

University of Oklahoma

Postdoctoral Researcher

**Advisor:** Jens Redemann, PhD

* Atmospheric Turbulence and Air Quality (ATAQ) Laboratory 2018

Department of Physics, University of Nevada, Reno

Postdoctoral Researcher

**Advisor:** Heather A. Holmes, PhD

* Supervising graduate students
* Atmospheric Turbulence and Air Quality (ATAQ) Laboratory 2014-2018

Department of Physics, University of Nevada, Reno

Graduate Research Assistant

**Advisor:** Heather A. Holmes, PhD

* Use of satellite retrievals and data assimilation techniques to estimate of surface PM2.5 concentrations in the western U.S.
* Investigation of atmospheric aerosol transport
* Evaluation of aerosol satellite retrievals (MODIS/VIIRS)
* Numerical weather prediction
* Desert Research Institute 2011-2014

Division of Atmospheric Sciences

Graduate Research Assistant

**Advisor:** Hans Moosmüller, PhD

* Use and evaluation of aerosol MODIS aerosol retrievals
* University of Nevada, Reno 2011-2014

Department of Physics

Graduate Research Assistant

**Advisor:** W. Patrick Arnott, PhD

* Investigate aerosol optical properties using sunphotometers and photoacoustic instruments
* Analysis of aerosol physical properties during fire and non-fire periods.
* Study of a local circulation and its impact in aerosol transport

**Teaching Experience:**

* Laboratory of General Physics I, University of Costa Rica, San Jose, Costa Rica 2009
* Invited lecturer (Universidad de Costa Rica): 2009
* General Physics II (FS 310)
* Tropical Synoptic Meteorology (FS 723)
* Invited lecturer (University of Nevada, Reno): 2011-2017
* Radiation Transfer (ATMS 749R)
* Data Acquisition: Satellite Remote Sensing (ATMS 792)
* Introduction to Atmospheric Physics (ATMS 611)
* Atmospheric Turbulence and Boundary Layer Meteorology (ATMS 745)
* Measurements in the Atmosphere (ATMS 748)
* Introduction to Meteorology (ATMS 117)
* Intermedia Meteorology (ATMS 317)
* Senior Thesis (ATMS 497)
* Special Topics: Introduction to Atmospheric Coding (PHYS 483)

**Professional Experience:**

* Engineering and Scientific Services, Inc., San Jose, Costa Rica 2009-2010

Computer programmer

* Numerical methods to program operation of matrices with large dimensions and apply them in FEM
* Numerical methods for several math problems.

**Journal Publications:**

* Pierce, A.M., **Loría-Salazar, S.M.,** Holmes, H.A., Gustin, M.S., 2019. Investigating horizontal and vertical pollution gradients in the atmosphere associated with an urban location in complex terrain, Reno, Nevada, USA. Atmos. Environ. 196, 103–117. https://doi.org/10.1016/j.atmosenv.2018.09.063
* Boehmler, J.M., **Loría-Salazar, S.M.**, Stevens, C., Long, J.D., Watts, A.C., Holmes, H.A., Barnard, J.C., Arnott, W.P., 2018. Development of a Multispectral Albedometer and Deployment on an Unmanned Aircraft for Evaluating Satellite Retrieved Surface Reflectance over Nevada’s Black Rock Desert. Sensors 18. https://doi.org/10.3390/s18103504
* Pierce, A.M., Gustin, M.S., Christensen, J.N., **Loría-Salazar, S.M.,** 2018a. Use of multiple tools including lead isotopes to decipher sources of ozone and reactive mercury to urban and rural locations in Nevada, USA. Sci. Total Environ. 615, 1411–1427. https://doi.org/10.1016/j.scitotenv.2017.08.284
* Pierce, A.M., **Loría-Salazar, S.M.**, Arnott, W.P., Edwards, G.C., Miller, M.B., Gustin, M.S., 2018b. Aggregated particles caused by instrument artifact. Atmospheric Meas. Tech. 11, 2225–2237. https://doi.org/10.5194/amt-11-2225-2018
* **Loría-Salazar, S.M.,** Panorska, A., Arnott, W.P., Barnard, J.C., Boehmler, J.M., Holmes, H.A., 2017. Toward understanding atmospheric physics impacting the relationship between columnar aerosol optical depth and near-surface PM2.5 mass concentrations in Nevada and California, U.S.A., during 2013. Atmos. Environ. 171, 289–300. http://dx.doi.org/10.1016/j.atmosenv.2017.10.023
* Sexauer Gustin, M., Pierce, A.M., Huang, J., Miller, M.B., Holmes, H.A., **Loria-Salazar, S.M.,** 2016. Evidence for Different Reactive Hg Sources and Chemical Compounds at Adjacent Valley and High Elevation Locations. Environ. Sci. Technol. https://doi.org/10.1021/acs.est.6b03339
* **Loría-Salazar, S.M.,** Holmes, H.A., Arnott, W.P., Barnard, J.C., Moosmüller, H., 2016. Evaluation of MODIS columnar aerosol retrievals using AERONET in semi-arid Nevada and California, U.S.A., during the summer of 2012. Atmos. Environ. 144, 345–360. https://doi.org/10.1016/j.atmosenv.2016.08.070
* **Loría-Salazar, S.M.,** Arnott, W.P., Moosmüller, H., 2014. Accuracy of near-surface aerosol extinction determined from columnar aerosol optical depth measurements in Reno, NV, USA. J. Geophys. Res. Atmospheres 119, 2014JD022138. https://doi.org/10.1002/2014JD022138
* Chakrabarty, R.K., Arnold, I.J., Francisco, D.M., Hatchett, B., Hosseinpour, F., **Loria, M.,** Pokharel, A., Woody, B.M., 2013. Black and brown carbon fractal aggregates from combustion of two fuels widely used in Asian rituals. J. Quant. Spectrosc. Radiat. Transf., 122, 25–30. https://doi.org/10.1016/j.jqsrt.2012.12.011

**Submitted or In-Preparation Manuscripts:**

* *Submitted:* **Loría-Salazar, S. M.,** Sayer, A. M., Huang J., Flynn, C., Lareau N., Lyapustin, A.,

Redemann J., Welton E., Wilkins, J., Holmes, H. A., Evaluation of Novel NASA MODIS and VIIRS Aerosol Products and Development of Air Quality Fire Ratio During Extreme Fire Events in the Western U.S., J. Geophys. Res., October 2020.

* *In-preparation*: **Loría-Salazar, S. M.,** Holmes H. A., Ivey, C. E., & Chang, H. H., Spatiotemporal estimates of surface PM2.5 concentrations in the western U.S. using NASA MODIS retrievals and data assimilation techniques.
* *In-preparation*: Huang, J., **Loría-Salazar, S. M.,** Redemann, J., *&*Holmes H. A. Understanding the impact of surface reflectance on aerosol satellite retrievals in semi-arid western U.S. using statistical analytical analysis and machine learning techniques
* *In-preparation*: **Loría-Salazar, S. M.,** Sayer, A. M., Barnard, J. C., Arnott., W. P., & Jens Redemann**,** Understanding the Symbiotic Relationship Affecting Atmospheric Processes and Aerosols Concentrations in Reno, Nevada, USA from 2012-2019
* *In-preparation*: **Loría-Salazar, S. M.,** Sayer, A. M., Barnard, J. C., Arnott., W. P., & Jens Redemann Investigation of Columnar, Ground-Level Intensive, Extensive Aerosol Properties, and the Role of Weather in Aerosol Pollution Concentrations in Reno, NV, USA from 2012-2019 Dec/2019
* *In-preparation*: **Loría-Salazar, S. M.,** Lee, J., Sayer, A. M., A., Flynn, C., Huang, J., & Holmes, H. A., & Jens Redemann, Improving Daily Surface Particulate Matter Estimates during Extreme Fire Events using a Novel NASA Satellite Plume Injection Height Algorithm
* *In-preparation*: **Loría-Salazar, S. M.,** & Jens Redemann, Integrating Geostationary Aerosol Satellite Products and Machine Learning Techniques into Air Quality studies of Wildfire Smoke

**Conferences, Presentations, and Poster Sessions:**

* *In-preparation:* **Poster presentation, AMS Annual Meeting (Virtual)**

Distinguishing between Local Generated and Long-Rage Transport of Wildfire Smoke in Oklahoma from 2015 to 2019 Jan 2020

* *In-preparation:* **Lead Oral presentation, AMS Annual Meeting (Virtual)**

Toward Understanding the Effect of Smoke Aerosols on Boundary Layer Properties and Regional Weather due to Local-Generated and Transported Smoke Jan 2020

* *In-preparation:* **Poster presentation, AGU Fall Meeting (Virtual)**

Investigation of Aerosol Properties and Transport on Severe Weather in Oklahoma USA from 2015-2019 Dec 2020

* *In-preparation:* **Lead Oral presentation, AGU Fall Meeting (Virtual)**

Improving Daily Surface Particulate Matter Estimates during Extreme Fire Events using a Novel NASA Satellite Plume Injection Height Algorithm Dec 2020

* *In-preparation:* **Lead Session Chair, AGU Fall Meeting (Virtual)**

Monitoring, Modeling, Forecasting, and Communicating Health Impacts of Fire and Other Anthropogenic Emissions Dec 2020

* **Lead Oral Presenter, 3rd International Smoke Symposium (Virtual)**

Improving Daily Surface Particulate Matter Estimates during Extreme Fire Events using a Novel NASA Satellite Plume Injection Height Algorithm 2020

* **Invited Oral Presenter, AMS Student Conference in Boston, Massachusetts**

Mastering Your Doctorate 2020

* **Lead Poster Presenter, AMS Annual Meeting in Boston, Massachusetts**

Understanding the Symbiotic Relationship Affecting Atmospheric Processes and Aerosols Concentrations in Reno, Nevada, USA from 2012-2019 2020

* **Lead Session Chair, AGU Fall Meeting in San Francisco, California**

Integrating Human Response into Air Pollution Studies 2019

* **Lead Poster Presenter, AGU Fall Meeting in San Francisco, California**

Investigation of Columnar, Ground-Level Intensive, Extensive Aerosol Properties, and the Role

of Weather in Aerosol Pollution Concentrations in Reno, NV, USA from 2012-2019 2019

* **Lead Oral Presenter, AAAR Annual Conference in Portland, Oregon**

Improving Daily Surface Particulate Matter Estimates during Extreme Fire Events using a Novel NASA Satellite Plume Injection Height Algorithm 2019

* **Lead Poster Presenter, AAAR Annual Conference in Portland, Oregon**

Spatiotemporal estimates of surface PM2.5 concentrations in the western U.S. using NASA MODIS aerosol retrievals and data assimilation techniques 2019

* **Lead Oral Presenter, Global Monitoring Annual Conference, Boulder, Colorado**

Evaluation of Novel NASA Aerosol Fire Products Over Extreme Fire Events in the Semi-Arid Western U.S. 2019

* **Invited Oral Presenter, National Weather Center Colloquium, Norman, Oklahoma**

Determining the effectiveness of satellite remote sensing products to quantify aerosol pollution in the semi-arid western U.S. 2019

* **Invited Oral Presenter, Weather and Climate OU’s School of Meteorology Seminar, Norman, Oklahoma**

Toward Understanding Atmospheric Physics Impacting the Relationship between Columnar Aerosol Optical Depth and Near-Surface PM2.5 Mass Concentrations in Nevada and California, U.S.A., During 2013 2018

* **Lead Oral Presenter, CMAS Annual Meeting in Chapel Hill, North Carolina**

Evaluation of Novel NASA Aerosol Products during the Yosemite Rim Fire 2018

* **Lead Oral Poster, CMAS Annual Meeting in Chapel Hill, North Carolina**

Spatiotemporal estimates of surface PM2.5 concentrations in the western U.S. using NASA MODIS retrievals and data assimilation techniques 2018

* **Lead Oral Presenter, CMAS Annual Meeting in Chapel Hill, North Carolina**

Quantifying the error in satellite AOD retrievals associated with surface reflectance uncertainties in the semi-arid western U.S. 2018

* **Lead Oral Presenter, CMAS Annual Meeting in Chapel Hill, North Carolina**

Investigation of the Atmospheric Conditions Governing the Relationship between Aerosol Optical Depth and Surface PM2.5 Concentrations in the Western U.S. 2017

* **Lead Oral Presenter, CMAS Annual Meeting in Chapel Hill, North Carolina**

Spatiotemporal estimates of surface PM2.5 concentrations in the western U.S. using NASA MODIS retrievals and data assimilation techniques 2017

* **Lead Oral Presenter, AAAR Annual Meeting in Raleigh, North Carolina**

Toward Understanding Atmospheric Physics Impacting the Relationship between Columnar Aerosol Optical Depth and Near-Surface PM2.5 Mass Concentrations in Nevada and California, U.S.A., During 2013 2017

* **Lead Oral Presenter, AEROCenter Seminar, NASA GSFC in Greenbelt, Maryland**

Toward Understanding Atmospheric Physics Impacting the Relationship between Columnar Aerosol Optical Depth and Near-Surface PM2.5 Mass Concentrations in Nevada and California, U.S.A., During 2013 2017

* **Lead Poster Presenter, Modeling in Cloud Workshop in Boulder, Colorado**

Toward Understanding Atmospheric Physics Impacting the Relationship between Columnar Aerosol Optical Depth and Near-Surface PM2.5 Mass Concentrations in Nevada and California, U.S.A., During 2013 2017

* **Lead Oral Presenter, American Geophysical Union, Fall meeting in San Francisco, California**

Can the physical properties associated with uncertainties in the NASA MODIS AOD retrievals in the **w**estern U.S. be determined? 2016

* **Lead Oral Presenter, American Physical Union Far West Section in Davis, California**

Spatial Surface PM2.5 Concentration Estimates Challenges in the Western U.S. Using Satellite Retrievals and Data Assimilation Techniques 2016

* **Lead Oral Presenter, Earth, Air, Water Campus Conference in Reno, Nevada**

Spatial Surface PM2.5 Concentration Estimates for Wildfire Smoke Plumes in the Western U.S. Using Satellite Retrievals and Data Assimilation Techniques 2016

* **Lead Oral Presenter, A&WMA Eastern Chapter Scholarship Recipient Presentations in Reno, Nevada**

Spatiotemporal estimates of surface PM2.5 concentrations in the western U.S. using NASA satellite retrievals and data assimilation techniques 2016

* **Lead Poster Presenter, AGU Fall Meeting in San Francisco, California**

Spatial Surface PM2.5 Concentration Estimates for Wildfire Smoke Plumes in the Western U.S. Using Satellite Retrievals and Data Assimilation Techniques 2015

* **Lead Oral Presenter, CMAS Annual Meeting in Chapel Hill, North Carolina**

Spatial evaluation of surface PM2.5 estimates using columnar aerosol optical depth from MODIS retrievals in the western U.S.  2015

* **Lead Poster Presenter, AGU Fall Meeting in San Francisco, California**

Spatial Investigation of Columnar AOD and Near-Surface PM2.5 Concentrations During the 2013 American and Yosemite Rim Fires 2014

* **Lead Oral Presenter, APS Far West Section in Reno, Nevada**

Assessment of Columnar AOD and Near-Surface PM2.5 Concentrations in Reno NV. During the 2013 American and Yosemite Rim Fires 2014

* **Lead Poster Presenter, AGU Fall Meeting in San Francisco, California**

Evaluation of Air Pollution Applications of AERONET and MODIS Aerosol Column

Optical Depth by Comparison with In Situ Measurements of Aerosol Light Scattering and

Absorption for Reno, NV, USA 2012

* **UNIDATA poster session, UNIDATA Workshop in Boulder, Colorado**

“Worldwide Aerosol Optical Depth Assessed Using The Aerosol Robotic Network (AERONET) Measurements” 2012

* **Lead Poster Presenter, AGU Fall Meeting in San Francisco, California**

“Comparison of Atmospheric Column Optical Depth Measurements for Urban Reno, NV with Three Different Sun Photometers and In Situ Measurements Combined with Boundary Layer Height Estimation” 2011

* **Lead Oral Presentation, AAAR Annual Meeting in Orlando, Florida**

“Comparison of Atmospheric Column Optical Depth for Reno, NV from In Situ Photoacoustic and Nephelometer Measurements and Sun Photometers” 2011

**Funding:**

* **For submission:** Concept of OU/Ligado Partnership Utilizing GRB-T Network 2019

**My contribution:** Integrating Geostationary Aerosol Satellite Products into Air Quality studies of Wildfire Smoke

**Pi:** Jens Redemann

**Budget:** $80,000

* **Selected:** Nevada NASA Space Grant Consortium Research Infrastructure 2017

**Title:** NASA Collaboration to Acquire Satellite Remote Sensing Data for Air Quality Modeling in the Western U.S.

**Budget: $28,830**

From: 01-01-2017, to: 12-31-2017

* **Selected:** NASA Earth and Space Science Student Fellowship (NESSF) 2016/2018

**Title:** Spatiotemporal estimates of surface PM2.5 concentrations in the western U.S. using NASA MODIS-VIIRS retrievals and data assimilation techniques

**Budget (2016-2017): $30,000**

From: 09-01-2016, to: 08-31-2017

**Budget (2017-2018): $45,000**

From: 09-01-2017, to: 08-31-2018

* **Not Selected:** HEI RFA 19-1: Applying Novel Approaches to Improve Long-Term Exposure Assessment of Outdoor Air Pollution for Health Studies 2019
* **Not Selected:** Joint Fire Science Program (JFSP) 2015
* **Not Selected:** NASA Earth and Space Science Student Fellowship (NESSF) 2012-2015

**Awards, Scholarships & Special Recognition:**

* **Fellowship:** NASA Earth and Space Science Student Fellowship (NESSF) 2016/2018
* **Scholarship**: Eastern Sierra Chapter Air &Waste Management Association 2015
* **Special Recognition:** Outstanding graduate student - Nevada Silver and Blue Magazine 2015

(http://www.unr.edu/silverandblue/archive/2015/winter/NSB\_Winter\_2015\_WEB.pdf)

* **UNR scholarships and awards:**
* Outstanding Graduating Graduate Student Award 2018
* Outstanding Graduate Student Researcher Award 2017
* Graduate Dean's Merit Scholarship 2017
* Outstanding International Graduate Student 2015, 2016
* International Student Scholarship 2015, 2016
* **Award:** Student poster competition (3rd position) - Desert Research Institute 2015
* **Award:** Science fair - Colegio del Sagrado Corazón de Jesús, Cartago, Costa Rica 2002

**Professional Memberships:**

* Air &Waste Management Association (A&WMA)
* American Physical Society (APS)
* American Geophysical Society (AGU)
* American Meteorological Society (AMS)
* American Association of Aerosol Research (AAAR)

**Trainings Attended**

* Online training: PACE Applications Workshop:

Data, Tools, Methods and Applications 2020

* In-Person training: NASA Satellite Remote Sensing:

Data, Tools, Methods and Applications 2017

* Online training: NASA Satellite Remote Sensing of Particulate Matter Air Quality:

Data, Tools, Methods and Applications 2015

* Numerical Modeling and High-Performance Computing Workshop 2014
* In-Person training: NASA Satellite Remote Sensing of Particulate Matter Air Quality:

Data, Tools, Methods and Applications 2012

* Online training: NASA Satellite Remote Sensing of Particulate Matter Air Quality:

Data, Tools, Methods and Applications 2012

**Academic Activities & Leadership:**

* **Master Thesis advisor: Sean Spratley** 2019-2021
* **NASA PACE Early Adopters program**  2019-Pres.
* **Aerosol (A) and Clouds, Convection and Precipitation (CCP) NASA Weather and Air Quality Forecasting Workshop** 2019
* **Latin American and First Generation Students Social Mixer at SoM (OU)**  2019- Pres.

Faculty member and founder

* **Eastern Sierra Chapter of the A&WMA**  2018- 2019

Board member

* **Eastern Sierra Chapter of the A&WMA**  2016-2017

Voluntary member

Organization of the ESC A&WMA Scholarship Fundraiser Dinner and Raffle

* **Senior Thesis advisor of Jayne Boehmler**  2015 -2016

University of Nevada, Reno; Undergrad Atmospheric Science Program

Senior thesis title: Investigation of Trans-Pacific Aerosol Pollution from Siberia, Russia Wildfires to Reno, NV during April 2015

* **Senior Thesis advisor: Brian Echaverria**  2013
University of Nevada, Reno; Undergraduate Atmospheric Sciences Program

Senior thesis title: Aerosol Vertical Distribution Characterization over Reno, Nevada during August 2013

* Carrier fair, University of Costa Rica, San Jose, Costa Rica 2008

**Technical Skills:**

Languages

* English (Full professional proficiency)
* Spanish (Native)

Field equipment

* Cimel CE-318 sunphotometer
* Photoacoustic and Nephelometer
* Custom sunphotometer
* Lidar
* MFRSR

Computational

* Programming: Objective C, C, FORTRAN
* Command Prompt: bash, shell
* Statistical Programs: SPSS, Excel, MiniTab
* Data Analysis: MATLAB, R, Python
* Computer Enviroments: Linux, Windows, Unix
* Weather models: WRF, NAM
* Data Skills: Data assimilation, Big data, data visualization

Data processing

* AERONET - MODIS - MAIAC - CALIPSO - VIIRS - EPA
* IMPROVE - Balloon soundings - Weather stations - Reanalysis - NetCDF - HDF
* LiDAR